EXECUTIVE SUMMARY

Chapter 1 INTRODUCTION

The Coastal Clean Water Plan is Alaska=s response to Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990. Congress created Section 6217, titled AProtecting Coastal Waters,@ to help address nonpoint source pollution problems nationwide. Examples of nonpoint source pollution are failing septic tanks and leachfields oozing to the surface, runoff and snowmelt carrying oil and grease into streams and poorly constructed logging roads creating sediment.

Section 6217 requires states such as Alaska, with coastal zone management programs, to develop Acoastal nonpoint pollution control programs.@ Congress did not expect states to develop new, stand-alone, nonpoint pollution programs. Rather, the coastal nonpoint pollution programs are to strengthen and build upon existing state and local expertise and authority.

Section 6217 has two major components. The foundation of the first component are Amanagement measures@ or objectives that coastal states must implement. There are about 55 management measures that address nonpoint pollution from agriculture, forestry, urban development, marinas and hydromodification and the protection and restoration of wetlands and riparian areas. The measures are listed in the 1993 EPA *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters.*

State=s can develop alternatives if the EPA measures are not economically achievable or the pollution sources they address do not exist. Alaska analyzed the EPA management measures and determined that the New Development measure in the urban section is not achievable. Therefore, the state will develop an alternative measure that is practical and affordable. In addition, the state determined that agriculture in the coastal region was not a significant source of nonpoint pollution and therefore will not be including the agriculture management measures in its program.

The second major component of Section 6217 focuses on restoring degraded waters. State=s must develop additional management measures where existing nonpoint pollution controls or the general management measures mentioned above are not adequate to restore water quality.

State=s will implement the management measures through regulatory programs or by voluntary programs backed up by enforceable authorities.

Timeline for development and implementation of coastal nonpoint pollution programs is provided below:

mid-1995	Coastal state=s submit programs to NOAA and EPA.
early 1996	NOAA and EPA review state=s programs and grant either full approval or conditional approval. Conditional approval is granted if state=s programs need additional time to develop incomplete elements or to demonstrate that existing authorities are adequate to implement the measures. Alaska expects to receive conditional approval.
1999	NOAA and EPA evaluate the progress of coastal states that received conditional approval towards achieving widespread implementation of management measures.
2001	Penalties of up to 30% reduction in funding to the Alaska Coastal Management Program and the Department of Environmental Conservation=s Section 319 Nonpoint Pollution Control Program are applied if the state does not have a full approval.
2004	Implementation of all general management measures must be complete.
2009	Implementation of additional measures where necessary to meet water quality standards must be complete.

Chapter 2 PUBLIC PARTICIPATION AND TECHNICAL ASSISTANCE

The goals for the Coastal Clean Water Plan Public Participation component are to:
1) increase the public=s awareness and understanding that clean water is in their best interest; 2) increase the public=s awareness and understanding of nonpoint source pollution--what it is, what its impacts are, how we all contribute to it; 3) improve dialog between governments and individuals, groups, industries and businesses in order to reach mutually acceptable goals and to find mutually acceptable solutions; and 4) work with the Section 319 Nonpoint Source Pollution Control Program to develop an overall public involvement and technical assistance program.

The goal for the Technical Assistance component is to help people solve problems by funding research, demonstration projects, databases, guidance manuals, training and other tools as appropriate.

These goals will be reached by 1) convening a meeting, or series of meetings, with state and federal resource agencies, educators, non-profit groups, Extension Service, native organizations, Water Watch groups and others to discuss strategies for education, public involvement and technical assistance. To avoid the Aready, fire, aim@ syndrome, the meetings will take place after the Section 319 Nonpoint Source Pollution needs assessment has been completed in August

1996; 2) continuing to fund the Coastal Clean Water grant program for coastal districts; and 3) developing annual Coastal Clean Water Plan public involvement, education and technical assistance workplans until the overall nonpoint source pollution strategy is finalized. Workplans should be completed by October of each year. The plan will use communication techniques that coastal district surveys determined were the most effective, and will tackle the most pervasive coastal pollution sources.

There are many different forums that the public has used to help shape the Coastal Clean Water Plan, including task forces, formal public review periods, mail-outs and publically noticed meetings. In addition, technical assistance has been provided to help affected users and local governments.

Chapter 3 ADMINISTRATIVE COORDINATION

The Coastal Clean Water Plan will reach its goals of protecting and restoring coastal waters by building upon and strengthening existing programs. The challenges for the Coastal Clean Water Plan, therefore, will be to gain the cooperation of stakeholders, identify areas of mutual concern and coordinate activities.

One of the primary mechanisms the state will use to improve interagency coordination and identify common goals and solutions is to complete a statewide nonpoint source pollution needs assessment and action plan during the next 18 months.

Planning should be within an institutional and policy framework designed to compel the interagency and intergovernmental cooperation and coordination necessary to achieve planning objectives (Council of State Governments, 1982). The Alaska Coastal Management Program provides that framework within the coastal zone. Because the ACMP is a networked program, projects in the coastal zone that are either a direct federal action, require a federal permit or require a state approval are reviewed jointly by the departments of Fish and Game, Environmental Conservation and Natural Resources and all affected coastal districts.

In addition, AS 46.40.200 requires state departments, boards and commissions to review their statutory authorities, regulations and procedures and take whatever action is necessary to facilitate full compliance with and implementation of the Alaska Coastal Management Program.

The Coastal Clean Water Plan helps every coastal district that is revising its enforceable policies to incorporate nonpoint source pollution controls into its program. Once the Coastal Clean Water Plan is approved, the Division of Governmental Coordination, in conjunction with the ACMP Working Group, '6217 Task Force and others will prepare a guidance manual of model enforceable policies.

Further discussions of interagency coordination mechanisms for specific pollution sources are found in the appropriate chapters.

Chapter 4 MANAGEMENT AREA

The Coastal Clean Water Plan applies within the State=s coastal zone, as established by the Alaska Coastal Management Program (ACMP). Alaska=s coastal zone encompasses nonpoint pollution sources that may have a significant impact on both coastal waters (waters adjacent to the shoreline which contain measurable quantities of seawater) and coastal resources (e.g., anadromous fish). This is a much broader geographic area than required by '6217(e), which only requires a management area large enough to protect coastal waters.

A survey of the 35 coastal district management plans and interviews with state agency staff and coastal district coordinators indicates that there are few uses and activities outside the coastal zone that have, or are likely to have, significant impacts on coastal waters. The major exception to this statement is the Municipality of Anchorage. However, all discharges within the municipality are covered under their National Pollutant Discharge Elimination System Storm Water Discharge application.

Chapter 5 FORESTRY

The Forest Resources and Practices Act and regulations cited in this plan constitute Alaska=s Coastal Clean Water Plan for Forestry. The FPA regulations in their entirety, in conjunction with additional non-regulatory components, constitute Alaska=s Section 319 Nonpoint Source Pollution Control requirements for activities subject to the FPA (11 AAC 95.185(h))

The goals of the Coastal Clean Water Plan for Forestry are for all timber harvest operations in the coastal zone to meet the State's Water Quality Standards and fully maintain and protect designated uses of State waters, and to obtain 95 percent operator compliance with all applicable requirements of the Forest Resources and Practices Act (FPA) and regulations.

The Action Plan for achieving the goals are to: 1) Review all detailed plans-of-operations submitted to the Department of Natural Resources within the timeframes provided by FPA. 2) Maintain a high number of routine inspections for compliance with FPA. 3) Develop and conduct a BMP implementation monitoring program. 4) Conduct and participate in comprehensive water quality monitoring projects to demonstrate BMP effectiveness in meeting Water Quality Standards. 5) Complete all forestry tasks contained in Alaska's 1990 Section 319 *Nonpoint Source Pollution Control Strategy;* and 6) Conduct operator and agency training sessions to inform new operators and agency staff of FPA requirements and findings from BMP

implementation and effectiveness monitoring studies.

Budgetary and technical constraints may inhibit the State from achieving the goals and objectives of this plan. In addition, Alaska=s young geology, extreme weather conditions and highly variable hydrology make it difficult to separate the effects of forest practices from natural conditions. Developing monitoring parameters and protocols and methods for determining change (or the amount of change) that can be attributed to harvest activity is a challenge.

The Coastal Clean Water Plan for Forestry is applicable to commercial forestry activities in the coastal zone on private, state and other public forest lands that intersect, encompass or border on surface waters or riparian areas, or that occur on at least 10 acres in Region I, 40 acres in Region II or 40 acres in Region III if the owner owns more than 160 acres.

AS 41.17.100, Deployment of Broadcast Chemicals and 11 AAC 95.390 Site Preparation, are included in the '319 program but excluded from the Coastal Clean Water Plan. Forest chemicals and mechanical site preparation are of such minor duration and consequence in Alaska=s coastal regions that they are not currently or potentially significant sources of nonpoint pollution.

The lead agency responsible for the implementation and enforcement of Alaska's Forest Resources and Practices Act is the Department of Natural Resources. The departments of Environmental Conservation (DEC) and Fish and Game (ADF&G) are each assigned roles in administration of the FPA. As the lead agency on water quality matters, DEC is responsible for assuring that the FPA achieves Alaska's Water Quality Standards under Title 18. The Department of Fish and Game has authority under Title 16 to regulate activities in resident and anadromous fish-bearing streams which is recognized by FPA but administered independently of it.

The FPA requires federal land management plans, guidelines and standards to provide no less resource protection than the standards for state land (AS 41.17.900(b)(1)). The Department of Natural Resources and the Department of Environmental Conservation are in the process of certifying the Forest Service=s guidelines and standards. Final approval of this certification is pending on minor clarification and reorganization of the Forest Service's existing rules.

The State is excluding three EPA management measures from its Coastal Clean Water Plan: Site Preparation and Forest Regeneration, Fire Management and Forest Chemical Management. These sources of nonpoint pollution are of minor duration and consequence in Alaska=s coastal regions. All other EPA management measures are applicable and suitable for Alaska. The Forest Resources and Practices Act and regulations meet or exceed the federal requirements outlined in the management measures. Attachment 1 lists the applicable EPA management measures for forestry and the state authorities that meet them.

Chapter 6 URBAN AND COMMUNITY DEVELOPMENT

The overarching goal of the Coastal Clean Water Plan for Urban/Community Development is to ensure that State Water Quality Standards are met within all coastal waterbodies affected by urban/community development. To achieve this, the following steps will be taken:

1) Identify Alaska-specific Best Management Practices (BMP-s) that address urban sources of nonpoint pollution.

2) Prepare an urban BMP implementation manual.

3) Prepare a comprehensive urban BMP monitoring strategy.

4) Implement the urban BMP monitoring program.

5) Develop recommendations for changing existing regulatory and non-regulatory programs to further the goals of the Coastal Clean Water Plan.

6) Develop a performance objective (management measure) for stormwater runoff from new development.

7) Improve communication and administrative coordination between local state and federal government agencies and the public. One of the mechanisms will be the creation of an inter-agency Urban Watershed Working Group.

8) Work with local governments to establish ordinances which address nonpoint source pollution.

9) Initiate a public awareness campaign to inform the public of the effects of urban nonpoint source pollution and practical ways for citizens to reduce nonpoint impacts to aquatic resources and water quality.

10) Where appropriate, evaluate and manage nonpoint source pollution impacts on a watershed protection basis.

11) Redefine the State's approach to urban nonpoint source pollution control through participating in the upcoming nonpoint source needs assessment and strategy revision. The upcoming nonpoint source pollution needs assessment and strategy revision will update and expand the 1990 Section 319 Nonpoint Pollution Control strategy, and will integrate the Coastal Clean Water Plan and Section 319 into one coordinated nonpoint source pollution control program.

Constraints to achieving the objectives of the Coastal Clean Water Plan for Urban/Community Development include: lack of industry, government and public awareness of the impacts of their activities on water quality; lack of funding, lack of data and unresolved legal and enforcement issues. Lack of understanding of the need for erosion and sediment control magnifies the difficulty of convincing municipalities to adopt and enforce appropriate BMP-s. Anchorage is drafting a BMP manual, and its eventual acceptance would be most helpful in this regard.

The 11 objectives outlined above are designed to overcome the constraints. Lack of funding or data should not be insurmountable barriers. There are many erosion and sediment control BMP manuals available for reference and many BMP-s are fairly standardized. The challenge will be to modify the BMP-s if needed to make them effective under Alaskan conditions. BMP-s will be modified as the state, cities and developers gain experience with them.

There are 154 organized municipalities in the State of Alaska, of which 129 are located within the coastal zone. Coastal Alaska has four distinct ecoregions -- Tundra, Alaska Range, Pacific Forest and Aleutian Island -- each of which has a unique pattern of urban and community development. Tundra communities are typically scattered on the banks of wide rivers that frequently flood, or along the open ocean coast. The ground surface is usually frozen from October through April, with permafrost (permanently frozen soil) occurring at an average depth of 12 to 18 inches. Soil types in communities on river corridors are typically composed of fine sediment and silt underlain by permafrost, while soils in villages facing the open ocean coast are sand and silt. Structures are designed and constructed to avoid disturbing the permafrost soil. Land disturbance during site development and construction of single family dwellings is usually less than 5,000 square feet.

While Bethel, the largest Tundra community, has a population of just over 5,000 people, the vast majority of communities in the region have less than 1,000 people. Communities are usually confined to an area of less than one square mile. Access is usually by aircraft and boat in the warmer months or aircraft and snow machines in the winter. Average annual rainfall in Bethel is 16.9 inches, and the 2 year/24 hour storm is 1.5 inches. The highest precipitation occurs in August, while less than 5 days a year have rainfall greater than 0.5 inches. Receiving waters are generally large lakes, streams and rivers. Less than 10% of rural villages in the tundra region have storm sewers. Development buffers, riparian setbacks, wetlands plans and other land use planning and zoning ordinances are rudimentary or non-existent in most communities.

Of the four ecoregions, Alaska Range communities are most similar to the Lower 48 States urban model, with more extensive road paving and higher density populations. Implementation of land use planning, zoning, development buffers and storm sewers is occurring.

The soils in the Alaska Range ecoregion are typically glacial till. Some developed sites are on gravel or sand where soils are highly permeable, but the majority of sites are on relatively impermeable soils or near surface bedrock. Precipitation in Anchorage, near the center of the

Alaska Range region, averages 15.3 inches annually, while the 2 year/24 hour storm is 1.5 inches and the 2 year/6 hour event is 0.66 inches. The peak precipitation period is July through September. Rainfall greater than 0.5 inches occurs approximately 5 days a year.

The Pacific Forest region is characterized by a temperate maritime climate with large amounts of rainfall occurring year-round. Average annual rainfall in Juneau, near the center of the Southeast Panhandle, is 50-90 inches, with wide variations from the north to south of the city. The 2 year/24 hour storm is 3.0 inches. The maximum precipitation occurs in October, with 28 days of rainfall exceeding 0.5 inches. In the rainy Pacific Forest region, pulse loadings are not as much of a concern compared to Tundra and Alaska Range regions, except in lower gradient streams.

The mountainous terrain of the Pacific Forest region has resulted in development along the coast and up stream and river valleys. The soils in the floodplains of these streams are predominantly silty, while those on the uplands are shallower and underlain by bedrock or thicker glacier till deposits. Stormwater runoff in developed areas is channeled by storm sewers, ditches, culverts, and creeks.

Juneau, Alaska's capital, is the largest municipality in the region with a population of 29,000. There are three cities in the region with populations between 7,500 and 15,000. Other municipalities range in size from less than a hundred people to 3,500 people. Communities are accessible by ferry or airplane. The only inter-community road system is on Prince of Wales Island in Southeast Alaska.

The Aleutian Island ecoregion is characterized by an extensive chain of volcanic islands extending from the southcentral mainland to the far western reaches of the Bering Sea. Aleutian Island communities are similar to those in the Tundra region in terms of demographics, but have a milder climate, heaver rainfall and no permafrost. Soils are shallow, volcanic and underlain with layers of uplifted sedimentary rock. Average annual rainfall is 40 to 60 inches, with most precipitation occurring during October through March. Land use planning, development buffers, and storm sewers are in the initial stages of implementation. Dutch Harbor is the largest Aleutian Island municipality, with a year-round population of just under 5,000. Access is by sea and air only.

The impacts of urban/community runoff and construction activities in each of the four major ecoregions can be significant. The most common impacts include defoliation of streambanks, sedimentation of anadromous fish habitat and the contamination of local waterbodies with coliform bacteria originating from both humans and domestic animals.

According to the Department of Environmental Conservation (ADEC) 1994 preliminary draft *Section 303(d) Water Quality Assessment* sixteen waterbodies in the Alaska Range ecoregion are impaired (do not meet State Water Quality Standards) by urban effects associated with roads, highways, industry and residential development. Fecal coliform, turbidity and biological

community alteration are the most common problems. Twelve waters in the Pacific Forest region are listed due to urban impacts. Turbidity, fecal coliform, petroleum products, sediment, debris, habitat modification, metals and low dissolved oxygen are the main causes of impairment. Anadromous fish returns in Duck Creek, in Juneau, are just remnants of previous years. Runoff from roads and housing development, improper culvert design and streambank defoliation are the principal causes.

Two Aleutian Island region waterbodies are impaired due to petroleum products in urban runoff, industrial operations and septic tanks. One impaired water in the Tundra ecoregion is located in King Salmon, and is listed due to the presence of petroleum products, metals, and pesticides from an abandoned landfill.

The prevalence of onsite disposal systems (septic systems) varies among the ecoregions. Septic systems are not used in tundra communities due to the presence of permafrost. Some communities have aboveground sewers, or individual households use honeybuckets or holding tanks. In the honeybucket system, human waste in buckets is hand-carried from the dwelling to community storage pits or landfills, or dumped directly onto the ground or ice or into the water. Alaska Range, Pacific Forest and Aleutian Island towns and cities use both onsite and centralized wastewater disposal systems. Onsite disposal systems sometimes use marine outfalls.

The Alaska Department of Environmental Conservation (ADEC) is drafting new regulations to initiate an onsite disposal system installer's certification program. ADEC also conducts an audit stamp program. Some lending institutions, as a condition of making a loan, require that an engineer certify that existing septic systems have been inspected and pumped and new systems have been properly installed. The certification is stamped by ADEC in order for the buyer to qualify for financing. Last year, approximately 1,800 property transfers requiring onsite disposal system inspections occurred, involving about 1,300 existing and 500 new onsite disposal systems. The vast majority of these existing septic systems were approved by ADEC on the basis of engineer certification.

ADEC requires installations discharging in excess of 500 gallons per day receive domestic wastewater disposal permits. In addition, systems serving more than a single family dwelling or duplex must have approvals to both construct and operate. ADEC regulations also stipulate separation distances between onsite systems and surface waters (including marine waters), surface and subsurface drinking water supplies, impermeable strata, and breaks in slope and groundwater.

Failing onsite disposal systems in Alaskan coastal regions can pose significant risks to human health and water quality. Local waterbodies are in some cases unfit for swimming, shellfish harvesting and recreation due to onsite wastewater contamination. The presence of high nitrogen levels in surface waters may precede fecal coliform bacteria contamination. Hepatitis A,

dysentery and other pathogenic bacterial or viral outbreaks occur periodically, and are linked to both failing septic systems and dumping of honeybuckets. Although human wastes account for most documented cases of coliform contamination, domestic and wild animals are also responsible for the introduction of pathogenic coliform to urban surface waters.

Alaska=s coastal zone has 31.6 square miles of land per mile of public road. Similarly, the two coastal states of Maryland and Washington have about 0.4 and 0.9 square miles of land per mile of public road, respectively. About 7,473 miles or 66% of Alaska's roads occur in its 235,938 square mile coastal zone. Most of the roads are concentrated in the contiguous, more heavily urbanized areas of the Kenai Peninsula, Matanuska-Susitna borough and the Municipality of Anchorage. These areas support almost three-fourths of the state=s population. The rest of the population lives in scattered, small communities with limited to minor local road systems, often less than 5 miles.

Most of the small town and village roads are gravel-surfaced which allows for infiltration and sheet flow of precipitation to the sides of the road and onto the road embankment. Communities in the 4,000-10,000 population range have limited road systems, and while the percent of roads paved may be high, the extent of curb and gutter is generally low, so sheet flow is high. Runoff may have to be controlled and treated before being released to natural drainage systems.

In the Tundra ecoregion, road designers try to select routes that avoid permafrost. If permafrost cannot be avoided, then engineers use construction techniques that either prevent thawing or that remove individual lenses of permafrost.

Virtually all bridges on the state highway system are "hard surfaced" with either unrestricted or scupper controlled runoff. While most bridges occur on relatively low volume highways, there may be cases where the runoff could impact water quality of the receiving water body. If problems were to be documented on bridges of highways eligible for federal highway (ISTEA) funding, they could qualify to be retrofitted to eliminate or reduce the runoff problem to within acceptable limits.

Typical mechanical stormwater controls include oil/water and sediment (grit) separators installed in structures ranging from small drain sumps to huge vaults. The practicality of these techniques, particularly those that may not receive regular maintenance or are in areas of low traffic volumes of less than 30,000 Average Daily Traffic (ADT) is highly questionable. ADOT/PF is currently initiating a research study on a low volume highway on the Kenai Peninsula to determine the effectiveness of an expensive vault-type oil-grit separator at a vehicle pullout adjacent to the Moose River. Information from this study will help determine if and when these types of stormwater controls should be installed in the future.

Approximately half of the state's coastal zone receives high rainfall. The area encompasses the majority of the population and roads in the coastal zone. While the high rainfall at frequent

intervals increases the potential to intensify erosion and sedimentation, it has the opposite effect of diluting stormwater concentrations of dissolved solids, oil and grease, and other pollutants that do not adsorb onto sediments. This situation may increase the need for effective erosion and sedimentation prevention BMP's, yet reduce the need for intensive stormwater treatment BMP's.

Snow and ice control during winter is a major safety concern statewide and is addressed in state and local roadway maintenance plans. Unlike states such as Michigan, where frequent salting is the predominant method of snow control, Alaska relies on plowing followed by sanding to control snow. In small communities, no maintenance or plowing are common, and sanding and salting are rarely used. In bigger communities, salt is used most often as an additive (5%) to stored sand to keep it from freezing.

Recent studies conducted by the Federal Highway Administration indicate that hydrocarbon and toxic pollutant runoff loads from rural roads with less than 30,000 Average Daily Traffic are relatively minor compared to urban roads with ADT's of greater than 30,000 (Federal Highway Administration, 1990). Airborne materials from adjacent land uses were found to contribute more nonpoint source pollution than vehicular traffic. These materials were found to collect on the road, then get flushed off with the next precipitation event. Only a few road segments in Anchorage approach or exceed this number of cars in a day. In villages, road dust can be entrained by the wind and passing vehicles, however road systems are generally short and traffic volumes low, so these effects are localized.

Impacts due to erosion, sedimentation and stormwater runoff are generally limited to local events in the larger urban areas. An example would be snow plowed, blown or dumped onto roadside creeks or large, several acre snow storage areas that might affect groundwater. A recent mishap occurred in Juneau where sediments and trash that had accumulated during several years of marine snow disposal "grounded out" a cruise ship.

ADOT/PF initiated a multi-year study to identify the dissolved constituents and sediment load of the snow dump melt water, and then develop a predictive model of contaminant release quantities and rates during spring snowmelt. Information from this study will be used to design effective snow storage BMP's. A similar study may have to be carried out to determine the effects of meltwater from road snow berms adjacent to streams and wetlands.

Virtually all new and reconstructed state road, highway and bridge construction projects are federally funded and thus are subject to NEPA review. Where wetlands or waters of the U.S. are affected, projects are subject to the Corps 404 permit and DGC coastal consistency review processes. All of these reviews are structured to assure avoidance of wetland and water impacts where practicable and feasible and minimization of those impacts that cannot be avoided. It includes full resource agency review.

According to the draft preliminary 1994 Section 303(d) impaired waters list, road runoff or road

impoundment may have contributed to the impairment of six waterbodies in the coastal zone (excluding Anchorage). Pollutants identified are: dissolved oxygen, debris, metals, fecal coliform, turbidity, habitat modification, temperature and salinity. These waterbodies are subject to a total maximum daily load (TMDL) assessment. This assessment is required when existing controls will not work to maintain water quality. Usually the problem is due to multiple sources of pollutants and additional, innovative controls are required. Even though highway construction with its attendant ditching and placement of culverts may have had impacts, other urban impacts must be considered.

Improper placement of culverts in drainages or streams during highway construction may cause degradation of fish habitat by altering and diverting flows and may prevent the passage of fish due to increased flow velocities. Perching, deep embedment, steep gradients, using too small a diameter of pipe to handle most flows and improper installation techniques are the main causes of problems.

Fish passage design criteria for sizing and installing culverts are being developed through cooperative efforts between the Department of Transportation and Public Facilities, the Department of Fish and Game and the University of Alaska Fairbanks. DOT&PF is proposing additional field research to further refine these criteria, which will then be applied on all future DOT&PF culvert installations on new roadways and, where feasible, on highways that are being reconstructed.

Maintenance activities, if not properly carried out, can also increase erosion, sedimentation and pollution of wetlands, waterbodies and associated habitats. Correct procedures for handling drainage and drainage structures (including wetlands and stream crossings), snow and ice control, and hazardous materials spills are addressed in the Alaska Highway Maintenance and Operations Manual (ADOT&PF, 1993).

During road, highway and bridge construction, DOT/PF will follow its recently adopted *Erosion and Sediment Control Plan-Policy and Procedures* (Alaska Department of Transportation and Public Facilities, 1995) and its *Guide to Preparing Erosion and Sediment Control Plans* (Alaska Department of Transportation and Public Facilities, 1995) to minimize temporary and permanent erosion and sedimentation during project development, construction and maintenance. DOT/PF is also in the process of revising and updating its *Highway Drainage Manual* (Alaska Department of Transportation and Public Facilities, 1995) which also addresses stormwater runoff and erosion and sedimentation impacts with respect to highways and bridges in particular. In order to receive approval from the National Oceanic and Atmospheric Administration and the US Environmental Protection Agency, the Coastal Clean Water Plan must demonstrate that it meets applicable EPA management measures cited in the *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters.* The tables in Attachment 1 list the EPA management measures for urban development and roads, highways and bridges, and the state programs that meet the EPA measures. Note that the State has determined that the EPA

measure for New Development is not economically achievable. Over the next several years the State will develop an alternative measure that meets the intent of the EPA measure and is achievable under Alaskan conditions.

Chapter 7 HARBORS AND MARINAS

The goal of the Coastal Clean Water Plan for Harbors and Marinas is to reduce pollutants entering water through the use of best available practices in planning, design, construction, maintenance and operation.

The Plan applies to new, significantly expanding and existing facilities in the coastal zone that support at least ten recreational vessels.

The majority of permanently-moored recreational vessels in Alaska are kept at harbors designed, built and owned by the Department of Transportation and Public Facilities. Three-fourths of the DOT&PF facilities are maintained under management agreements between DOT&PF and the local community. Approximately 11,000 vessels occupy moorage in the 34,000 miles of coastal shoreline. Almost 5000 are considered recreational vessels. There are 34,000 recreational vessels registered in Alaska.

Harbors in Southeast Alaska support a mix of recreational and commercial activity but are predominantly commercial. Harbors with a high percentage of recreational vessels are found in Prince William Sound. Very few harbors have been constructed on the western and northern coast of Alaska due to the extreme temperatures, short ice-free seasons and hostile weather conditions.

Circulation in harbors is generally good. Two-thirds of the state's harbors have tides in excess of 10 feet; in 90 percent of the state=s harbors, the tidal range exceeds six feet. Designers can take advantage of these tides to provide natural flushing of a harbor basin. Fewer than five existing harbors have poor flushing characteristics.

Water quality in harbors and marinas is influenced by several factors. Glacial rivers carry thousands of cubic yards a day of fine suspended sediments to the ocean. The sediments not only affect dredging needs in harbors but also impact baseline total suspended solids (TSS) values. While harbors are located and designed to avoid the influence of these rivers, ambient TSS values may still be high.

Much of the Southeast Alaska and Gulf of Alaska coastline is characterized by high mountains, deep fiords and high tidal ranges. Water quality is generally excellent in those areas. Western Alaska has long, gently sloping beaches, moderate nearshore ocean depths and sand, gravel and silty bottom conditions. Since the western coast has only a few communities and rapidly

increasing depths off-shore, the water quality within harbors is assumed to have little or no impact on the ambient water outside the basin.

A developer must obtain a US Army Corps of Engineers Section 404 permit prior to construction of any new harbor or marina or modification of an existing facility. As part of this permitting process, an environmental analysis is performed to determine the impacts of a project on water quality; the extent to which these impacts can be avoided; and for those that cannot be avoided, how they can be minimized or mitigated. All state and federal resource/regulatory agencies review the environmental documents. In addition, the Department of Environmental Conservation must issue a Section 401 water quality certification certifying that the project meets state Water Quality Standards, and the Alaska Coastal Management Program must find the project consistent with state and local coastal management enforceable policies. If water quality information provided in the environmental analysis is inadequate, the DEC can request additional water quality data before issuing a Section 401 certification.

The Department of Transportation and Public Facilities performs habitat assessments if a harbor is proposed in an important aquatic habitat such as eelgrass beds or salmon migration and rearing areas. In addition, the Department of Fish and Game can require a habitat assessment during the permit review phase. Habitat assessments can include dive surveys along transect lines, vegetation community mapping, macro invertebrate mapping and substrate mapping. Habitat assessments particularly try to identify resources such as eelgrass beds, clam/cockle beds, mussel beds, herring spawning areas, and salmon rearing areas. Because several marine mammals are endangered species, Endangered Species Act coordination must be done with the appropriate agency.

Typical shorelines along the Southeast Alaska, Gulf of Alaska and Aleutian Island coasts are steep and rocky with pocket beaches; therefore, shoreline erosion is relatively minor. Mainland Bering Sea beaches are composed of very erodible fine sands but recreational harbor development is virtually nil.

Alaska has relatively few upland hull maintenance areas. Fewer than ten marinas have dedicated paved upland maintenance areas or boat yards; 17 facilities have gravel areas. About 15 harbors have boat lifts to take large vessels out for maintenance. There are no upland hull maintenance areas currently planned at new or significantly expanding harbors. Many boats are pulled out of the water after the summer season and are maintained in winter storage areas away from the harbor. Larger vessels (greater than 24' in length) typically remain in water year-round and undergo maintenance on tidal grids.

Most upland hull maintenance areas are gravel lots that are set back from the water. The gravel provides natural filtration for runoff. Paved upland hull maintenance areas are typically less than 1/2 acre in size. Runoff from the paved areas goes into oil-water separators or settling ponds if required by Corps of Engineers designers or the Department of Environmental Conservation.

There are approximately 40 fueling facilities listed in the 1994 DOT&PF inventory of harbors and marinas. Seventy-five percent of these facilities indicated in a recent survey that they have containment and cleanup equipment (booms, pads or sorbents) at the fueling facilities. An additional ten harbors indicated that they have cleanup equipment although there is no fuel facility in the harbor. These numbers are likely to be low because the inventory is constantly being updated as information becomes available.

Typically, fuel docks are designed with a concrete deck and are located in an area with easy access, but away from the other floats due to fire potential. Fuel docks, if located within a harbor, should be visible from the harbormaster's office. Harbors must report all fuel spills greater than five gallons to the Coast Guard. The Coast Guard indicated that most harbors have reported spills. DOT&PF Harbor Management Agreements require clean-up equipment at fuel docks.

There are estimated to be at least 5100 recreational vessels having a marine head or portable toilet on board (Department of Fish and Game, 1993). The density of live-aboards is quite low. At the present time there are only four pumpouts in state-owned harbors. One of these has failed and is scheduled to be repaired. A cooperative program has been initiated between DOT&PF and the Department of Fish and Game to construct or expand pumpout stations in recreational harbors through Clean Vessel Act grants. During the first phase of the program, nine pumpout stations will be designed and constructed and one will be upgraded. This should provide services to about 90% of the salt-water recreational boaters in the state (Department of Fish and Game, 1993). Fish and Game is applying for Clean Vessel Act funds in 1996 to install additional pumpouts at harbors and marinas. Within the next five years there could potentially be about five-times the number of pumpouts as there are now.

Solid waste generated in Alaskan harbors is typical of most mixed recreational and commercial facilities, although actual quantities are not known. Twenty-nine harbors have one or more MARPOL services. All facilities that have management agreements with the DOT&PF must collect garbage. Batteries, nets, aluminum, copper and other materials are recycled at 26 facilities. The Aleutians East Borough developed guidelines for the operation and maintenance of marine refuse reception facilities.

There are approximately 60 grids throughout the state. Typical activities performed while a boat is on a grid includes power washing, changing zincs and maintaining or repairing propellers, cooling coils, rudder pintals, etc. Very seldom is sanding of hulls done on grids. In general, grids are used by 26-foot or greater vessels. Vessels 24-foot in length or less are usually trailered out of the water and repaired or maintained away from the harbor.

Solid waste pollutants associated with grids include bottom paint residue, solvents, organics and repair debris such as wasted zincs and fasteners. Bottom cleaning chemicals, paint (especially

paint containing lead, copper, mercury or tin) and solvents may be toxic or hazardous to marine organisms. The Corps of Engineers has found high concentrations of heavy metals in the sediments around many grids.

The potential for high volumes of sport-caught fish waste are possible during peak salmon runs. Marina operators will often post signs asking that fish not be cleaned on the docks for safety and water quality reasons. Concentrations of fish waste can cause an increase in the biochemical oxygen demand, dissolved oxygen and total suspended solids in a harbor. The stench from the waste can be annoying. Piles of fish waste are unsightly and can cause slippery docks. Recreational fish cleaning stations installed in some high summer-use marinas have created problems, leading some harbor operators to install floating dumpsters or to barge the fish waste outside the harbor waters.

According to the 1995 DOT&PF Alaska Harbor Management System survey, most harbors have waste oil collection facilities but few have hazardous waste collection points. Currently, hazardous materials are collected off-site at receiving stations set up during hazardous waste cleanup days. This appears to be adequate to control these types of materials. Liability to the harbor manager or owner is reduced as well.

According to the US Coast Guard, most harbors have reported oil sheens. Several coastal waters are impaired by bilge pumping and incidental fuel spills.

Most boat cleaning and maintenance is done out of the water. Knowledgeable staff believe that in-water cleaning of hulls by divers and power washing of decks is not extensive in Alaska.

Recreational boating along the high energy, rocky shorelines of Southeast Alaska and the Gulf of Alaska does not cause significant erosion or degradation of shallow water habitats. Although the Bering Sea coast in western Alaska has long, gently sloping beaches, moderate nearshore ocean depths and sand, gravel or silty bottoms, there is very little recreational boating due to severe weather and unprotected waters. Concerns have been expressed about boating-caused erosion on the Stikine River, Taku River and Alsek River in Southeast Alaska and the Kenai River in Southcentral Alaska. The Kenai River has documented erosion from boating activities. Because of this, the Kenai River has a management plan which limits outboard motor size to reduce wakes that erode the river banks and destroy fish habitat.

The Coastal Clean Water Plan for Harbors and Marinas will strive to carry out the following objectives:

1. Complete the Alaska Coastal and Harbor Design Procedures Manual which will incorporate nonpoint source pollution management measures. Scheduled completion is early 1997. Field test the effectiveness of the design procedures in protecting water quality by performing pre- and post-construction monitoring. Evaluate the findings from

the field and modify the text as needed. Scheduled completion 2000.

2. Establish harbor operation and maintenance Best Management Practices (BMP's) that reduce nonpoint source pollution.

3. Hold workshops for harbormasters and marina operators on how to prepare oil spill response plans and how to comply with MARPOL and DEC regulations. These classes could be conducted by DEC and the US Coast Guard.

4. Develop a boater education program.

The greatest obstacles to accomplishing these objectives are lack of funding for monitoring, design and management, and lack of awareness. In addition, because of Alaska=s varied climate and topography, there is rarely a Acookbook@ solution to any given problem. This leads to inconsistent quality control of marine design. To compound the situation, harbors in locations that are naturally protected, easily accessed or dredged have all been constructed. The Coastal Clean Water Plan will fund as many of the objectives as possible and will also seek additional sources of funding.

In order to receive approval from the National Oceanic and Atmospheric Administration and the US Environmental Protection Agency, the Coastal Clean Water Plan must demonstrate that it meets applicable EPA management measures cited in the *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters.* The attached tables list the EPA management measures for harbors and marinas and the state programs that meet the EPA measures. The main state programs that meet the EPA management measures for harbor siting and design are the DOT&PF *Coastal and Harbor Design Procedures Manual*, Alaska Coastal Management Program Habitats regulation, Department of Fish and Game fish habitat permit and Department of Environmental Conservation Section 401 Water Quality Certification. The main state programs that meet the EPA management measures for operation and maintenance are the proposed state harbor and marina operation and maintenance Best Management Practices guidance manual, harbor management agreements between DOT&PF and harbor operators, several Department of Environmental Conservation statutes and regulations and education and technical assistance programs for recreational boaters, marina managers and harbormasters.

Chapter 8 HYDROMODIFICATION

The goals of the Coastal Clean Water Plan for Hydromodification are to maintain water quality and quantity in unimpacted watersheds and to maintain healthy populations of plant and animal species by maintaining the aquatic and riparian habitats necessary to sustain them. For impacted watersheds, the goal is to restore degraded water quality and quantity to meet water quality

standards and protect designated uses and restore damaged aquatic populations by restoring their habitats.

The Plan applies to dams, channelization and channel modifications and human-caused shoreline and streambank erosion in the coastal zone.

Other than trapping insignificant amounts of sediment, run of the river dams in coastal Alaska are usually have been designed to have very little impact on the physical and chemical characteristics of the impounded stream segment and downstream reaches. Other dams can modify upstream and downstream flows, trap sediments, and in some instances, result in temperature modifications and gas supersaturation. There are only a few dams in Alaska that restrict fish passage, and those projects have fish bypass systems.

Channel modifications and human-caused erosion have had significant local impacts, but because of our large area, small population, and relatively recent development, the great majority of Alaska's streams and rivers are much closer to their natural condition than in any other state.

The objectives of the Coastal Clean Water Plan for Hydromodification are:

1. Develop a database which records and categorizes aquatic and terrestrial habitat problems from dam construction, operation, and maintenance, to assist in prioritizing impacts.

2. Develop BMP's for operation and maintenance of dams and attach as conditions on Department of Fish and Game Title 16 permits.

3. Hold training sessions for resource agencies that have a role in reviewing FERC licenses.

4. Identify modified and at-risk channels.

5. Identify impacted and at-risk habitats.

6. Develop mechanisms to protect and restore habitats.

7. Expand ongoing streambank stabilization demonstration projects to other areas of the state.

In order to receive approval from the National Oceanic and Atmospheric Administration and the US Environmental Protection Agency, the Coastal Clean Water Plan must demonstrate that it meets applicable EPA management measures cited in the *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters.* The attached tables list the EPA management measures for hydromodification, and the state programs that meet the EPA

measures.

Chapter 9 WETLANDS, RIPARIAN AREAS AND VEGETATED TREATMENT SYSTEMS

The goal of the Coastal Clean Water Plan for Wetlands and Riparian Areas is to develop a comprehensive strategy that protects high value wetlands and riparian areas, including areas that provide significant nonpoint pollution abatement functions, and restores high value wetlands with significant nonpoint pollution abatement functions where economically achievable and ecologically desirable. The short term goal for Vegetated Treatment Systems (VTS) is to determine their effectiveness under Alaskan conditions. If they are effective in some or all of Alaska, the long term goal is to promote their use.

The Coastal Clean Water Plan for Wetlands, Riparian Areas and Vegetated Treatment Systems applies to the Alaska coastal zone.

About 65% of Alaska's land area-- almost 175 million acres-- is wetlands. By comparison, wetlands occupy only 5% of the surface area of the Lower 48 states. Wetlands in Alaska include types commonly referred to as bogs, muskegs, wet and moist tundra, ferns, marshes, swamps, mud flats and salt marshes. Wetlands range in elevation from tideline to high alpine zones, and are as common on slopes as they are in lowlands and depressions, due to the presence of permafrost or high precipitation and shallow depth to bedrock. All of western and northern coastal Alaska is tundra, which the U.S. Army Corps of Engineers (Corps) identified as wetlands. Riparian areas have not been delineated.

Cumulative long term losses total less than 200,000 acres statewide, approximately 1/10 of 1 per cent of Alaska's total wetlands. Of this, about 80,000 acres have been lost due to agricultural development (however, virtually all of this acreage is outside the coastal zone and occurred before the major agricultural wetlands protection program referred to as Swampbuster), about 40,000 acres were lost in Anchorage before the Anchorage Wetlands Management Plan was adopted, about 15,000 acres in Juneau were lost before the adoption of the Juneau Wetlands Management Plan, and about 11,000 acres of wetlands were lost during the construction of the North Slope oil facilities and Haul Road. The remaining losses are primarily from placer mining before the 1940's.

There are no figures available for the acres of riparian areas lost or degraded.

Vegetated Treatment Systems are constructed wetlands and vegetated filter strips. Constructed wetlands are upland environments that have been modified to create poorly drained soils and wetlands flora and fauna for the primary purpose of pollutant removal from wastewaters or

runoff. Vegetated filter strips are created areas of vegetation designed to remove sediment and other pollutants from surface water runoff by filtration, absorption and various forms of deposition.

No comprehensive inventory of constructed wetlands and vegetated filter strips has been undertaken in Alaska. An informal survey of state and municipal personnel and review of selected reports indicate that only a few vegetated treatment systems exist in Alaska. The track record, data and science is very limited, and at this point VTS effectiveness is promising but inconclusive. The reason for the limited number of VTS projects may be due to the cold climate, short growing season, high rainfall in some regions and lack of information.

The Coastal Clean Water Plan for Wetlands, Riparian Areas and Vegetated Treatment Systems will seek to accomplish the following objectives

1. **Develop a comprehensive wetlands management strategy**. The purpose of this strategy is to do two things: develop a written document for managing wetlands and to obtain consensus among Alaskans for the objectives contained in the strategy.

2. **Develop a North Slope mitigation strategy**.

3. **Evaluate and continue development of General Permits**.

4. **Provide technical assistance to a Native organization.** DEC, EPA and the Chugachmuit Native Association (Prince William Sound area) will sign an environmental partnership agreement. As part of the agreement, DEC will assist the Native association in drafting a regional comprehensive wetlands plan, to be part of the Chugachmuit resource management plan.

5. **Determine the usefulness of the Hydrogeomorphic Assessment and Classification Methodology (HGM).** HGM is expected to provide Alaska with a methodology that will consider local unique conditions such as permafrost. Pollutant buffering and retention are considered in this methodology. Key state personnel will attend HGM training to learn if it can be applied in Alaska.

6. **Assist a community in preparing a wetlands conservation management plan**. The purpose of this task is to determine if local wetlands conservation management plans can improve wetlands management.

7. **Promote the use of VTS where these systems will serve a significant nonpoint source pollution abatement function**.

Funding is available for the next two state fiscal years (July 1,1995- June 30,1997) to accomplish

Action Plan objectives 1-5. The state will seek funding to accomplish objectives 6-7.

The most significant constraint to achieving the objectives is the uncertainty created by proposed federal legislation. Another constraint is the conflicting positions of Alaskan interest groups.

In order to receive approval from the National Oceanic and Atmospheric Administration and the Environmental Protection Agency, the Coastal Clean Water Plan must demonstrate that it meets applicable EPA management measures cited in *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters.* A list of the EPA management measures, and the state authorities that meet the intent of the measures is attached. The state has sufficient authority to protect wetlands and restore wetlands. No state authorities have been identified that promote the use of vegetated treatment systems, but the Coastal Clean Water Plan will make funding available for VTS projects if they are found to be effective.

Chapter 10 AGRICULTURE

Agricultural development in Alaska=s coastal region has an insignificant impact on coastal resources and human health.

Erosion and sedimentation from agricultural lands is minimal. Vegetable and grain production has the greatest potential for erosion, yet less than 900 acres were cultivated for vegetables in 1993 and 900 acres were planted in grains, generally using no-till practices. Erosion from livestock can also be a source of sediment, yet stocking rates on range and pasture averaged about 1.4 animals per 100 acres. The potential for increased erosion from agricultural lands in the future is minimal. New farms in the Point MacKenzie area will be subject to Farm Conservation Plans which include a soil erosion component.

Wastewater and runoff from confined animal facilities is also insignificant. There are only five dairies in the entire coastal region that are large enough to potentially cause problems. The dairies are widely separated and have approved waste management systems. There are no beef feedlots, stables, poultry facilities or swine facilities that meet the minimum size threshold. Within the next five years there may be another two dairies at the Point MacKenzie area. These facilities will have approved Farm Conservation Plans and approved waste management systems. About 4700 tons of commercial fertilizers were applied to about 11,000 acres of agricultural land in the entire coastal zone. Fertilizers are applied in May and June after the soils are thawed and the threat of overland flow has diminished. Precipitation is infrequent and of low intensity during that period.

Pesticides were applied to about 2,000 acres in 1992. Degradation rates are slow due to cold soil temperatures which can lead to over-application. The Alaska Cooperative Extension and USDA Natural Resources Conservation Service have developed educational materials for farmers that

address this concern. No pesticides have been found in surface or ground waters tested to date.

Although 700,000 acres are classified as suitable for sheep or cattle grazing, there is very little production. Average stocking density is 1.4 animals per 100 acres. Grazing leases are subject to management plans.

Less than 1000 acres were irrigated in 1992, consuming about 8800 acre-feet of water per year. There is no evidence of irrigation water entering surface waters through runoff.

Chapter 11 ADDITIONAL MEASURES

Section 6217(b) of the Coastal Zone Act Reauthorization Amendments and the EPA *Program Development and Approval Guidance* requires state coastal nonpoint pollution control programs to identify impaired and threatened coastal waters; identify land uses that cause or threaten water quality impairment; establish critical coastal areas (important areas that may need additional measures to protect against current or anticipated problems); develop and implement additional measures for the critical coastal areas and land uses if necessary to protect or restore water quality; monitor the effectiveness of the additional controls and revise the additional controls as needed.

The Department of Environmental Conservation has developed a preliminary draft list of impaired and threatened coastal waters. Nineteen impaired waters, one threatened water and two Awaters of concern@ have been tentatively identified as subject to the Coastal Clean Water Plan additional measures requirement.

DEC, in conjunction with EPA and affected parties, has already begun the process of identifying land uses that are causing or contributing to the degradation of the impaired waters, or that could potentially degrade threatened waters or waters of concern. Target date for completion of the identification process is 1997.

Two types of critical coastal areas will be established. The first type will focus on areas adjacent to waters that are already impaired; the second type will focus on areas adjacent to waters that are not impaired but are deemed important enough to warrant special consideration. The boundaries of the critical coastal area must encompass the significant sources of nonpoint pollution. The State, with input from other agencies, the public, affected parties and others will take the lead in developing boundary selection criteria and making recommendations on specific critical coastal areas.

The State, in conjunction with EPA and affected parties, has already begun the process of determining whether existing nonpoint source pollution controls are sufficient to bring impaired waters into compliance with the State=s Water Quality Standards. If evidence indicates that in

some cases existing controls are not adequate, the State and EPA will take the lead in developing additional controls to restore water quality. The additional controls are being developed under section 303(d) of the Clean Water Act, the Total Maximum Daily Load program.

For the second type of critical coastal area-- important areas warranting special consideration-- the State, with input from other agencies, affected parties and others, will take the lead in assessing management options for those areas. The assessment may indicate that additional controls are needed as soon as practical or that existing controls are sufficient to maintain water quality and/or aquatic habitat.

For both types of critical coastal area, if existing controls are determined to be adequate to restore water quality, but after a monitoring period they are shown to not be effective, then additional measures will need to be implemented as soon as practical.

The State will lead teams of experts who will work with the affected parties to develop additional measures tailored to the specific critical coastal area and land uses. The State will also provide technical support to assist the affected parties in implementing the additional measure(s). A monitoring program and schedule will be developed as part of the implementation package.

Chapter 12 MONITORING

The overall goals of the Coastal Clean Water Plan monitoring program are to assess over time the effectiveness of pollution controls in reducing pollution loads and improving water quality; and to determine the need for additional pollution controls to meet water quality objectives in the coastal zone. These goals will be achieved by

1) Surveying federal, state, local and industry personnel to determine what monitoring is already being done. Target date for completion of the directory is July 1996.

2) Determining monitoring objectives for key watersheds, key land uses and key pollution controls. Target date for completion of this task is July 1996.

3) Identifying monitoring or data gaps, if any. Target date for completion of the gap summary is July 1996.

4) Identifying the types of monitoring (implementation, trend, effectiveness, baseline, etc.) that are necessary to achieve goals and objectives.

5) Identifying available options to address the monitoring gaps. Target date for completion of this task is July 1996.

6) Implementing the monitoring program.

Tasks 2-5 will be coordinated with the Section 303(d) Total Maximum Daily Load program for impaired waterbodies that require additional pollution controls. The Section 303(d) program also requires monitoring to determine the effectiveness of additional controls.